Comparison of Dual-beamforming Algorithms on Nearfield Locational Audio Signals

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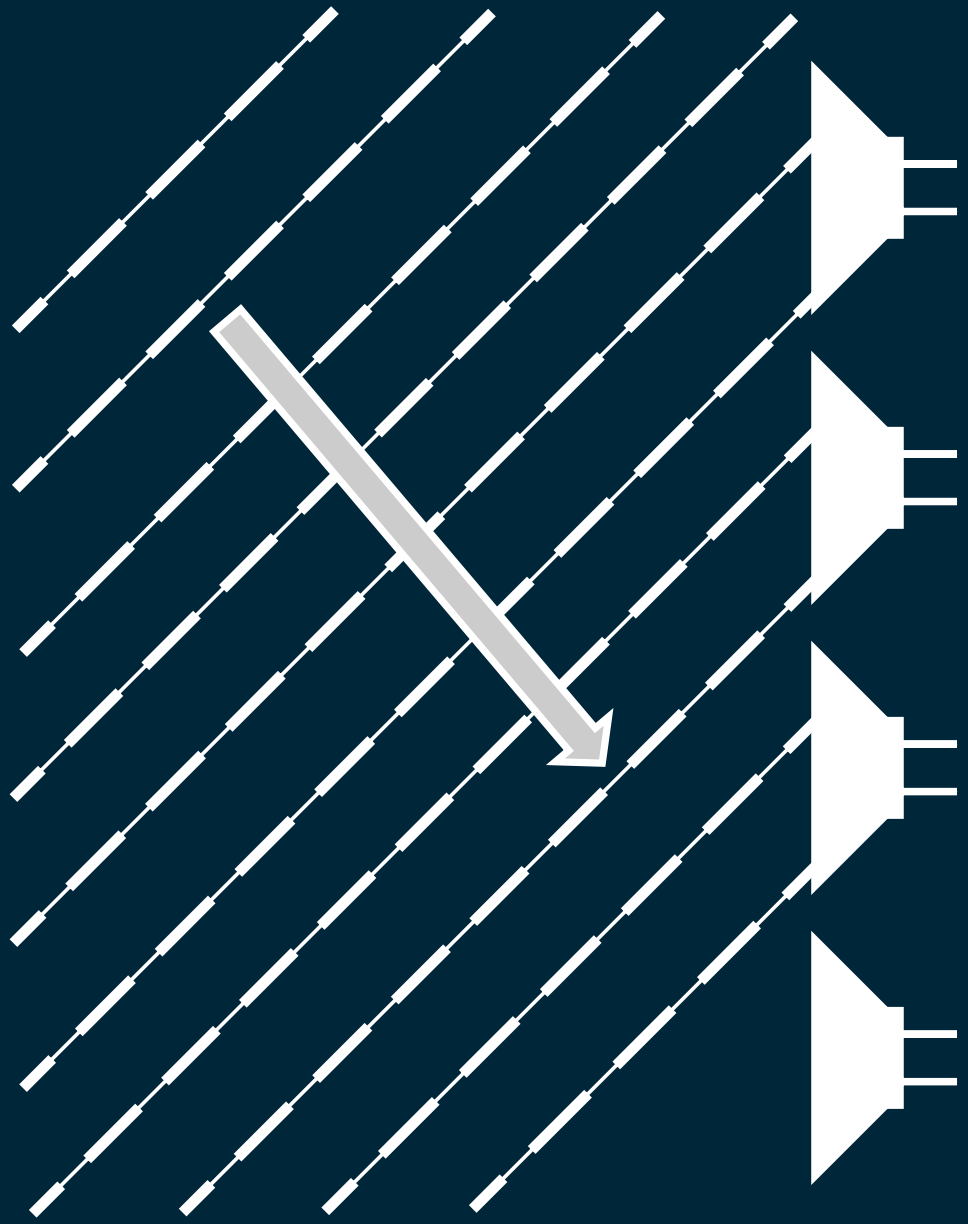
ELECTRICAL AND COMPUTER ENGINEERING

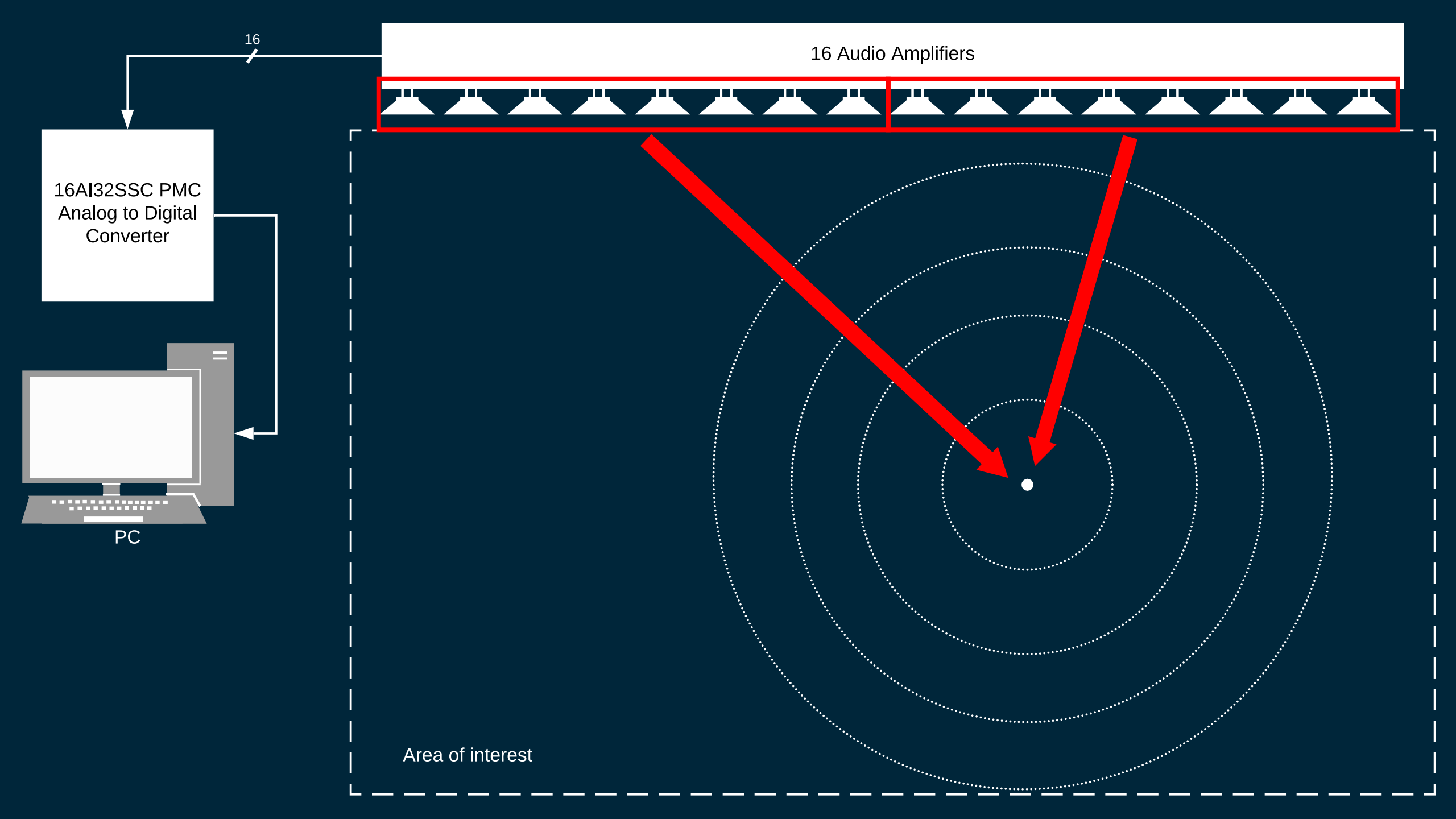
Objectives

- Implement two different locational focusing algorithms
- Determine which of the two algorithms is better at isolating an audio signal from nearby interfering signals
- Implement the algorithm that is better at isolating a signal in a real-time system

Beamforming

- “Steers” an array of sensors in a particular direction
- Uses time delay between sensors to determine direction of arrival
- More flexible and often smaller than spatial aperture

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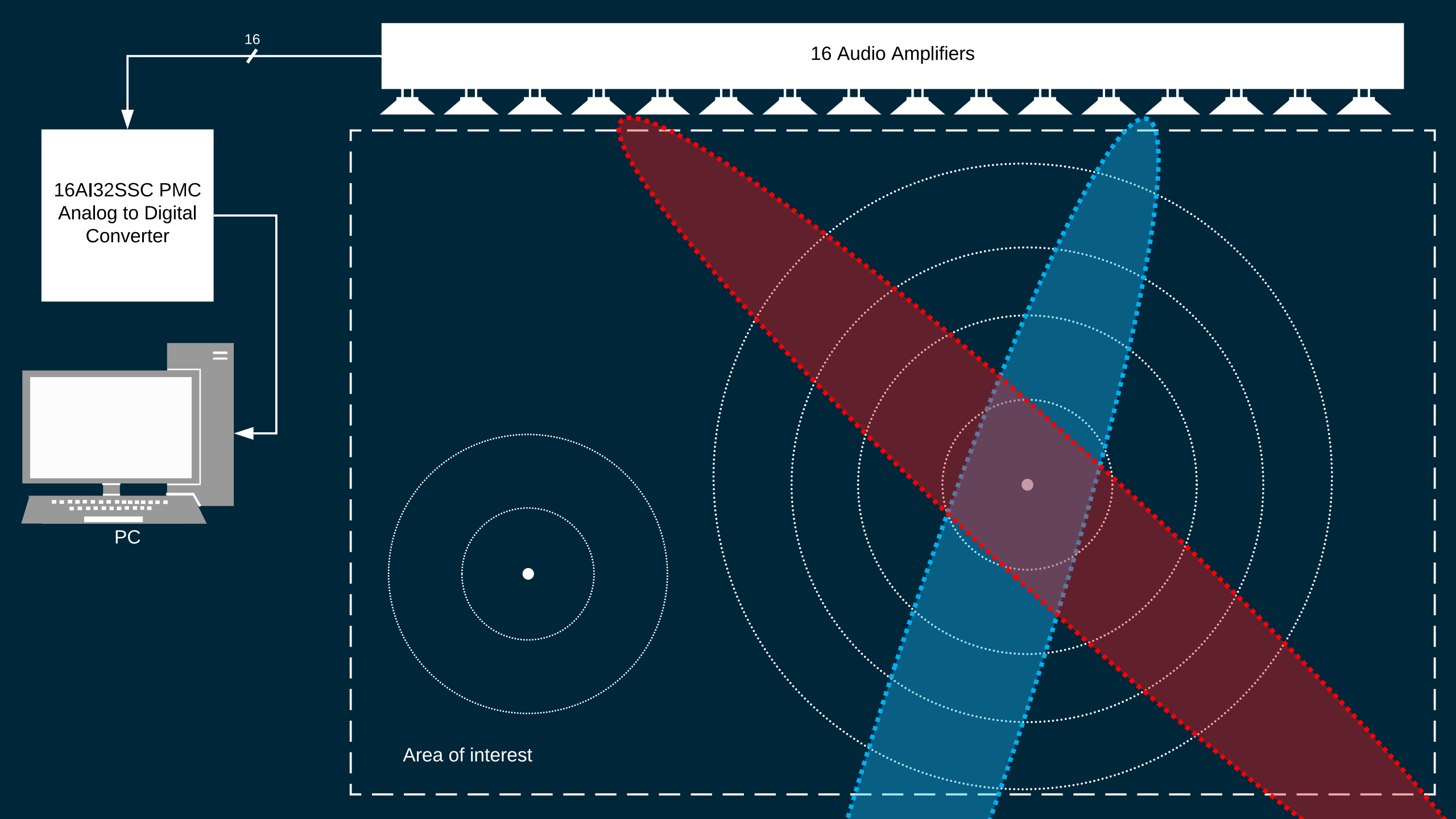
16 Audio Amplifiers
16AI32SSC PMC
Analog to Digital
Converter
PC
Area of interest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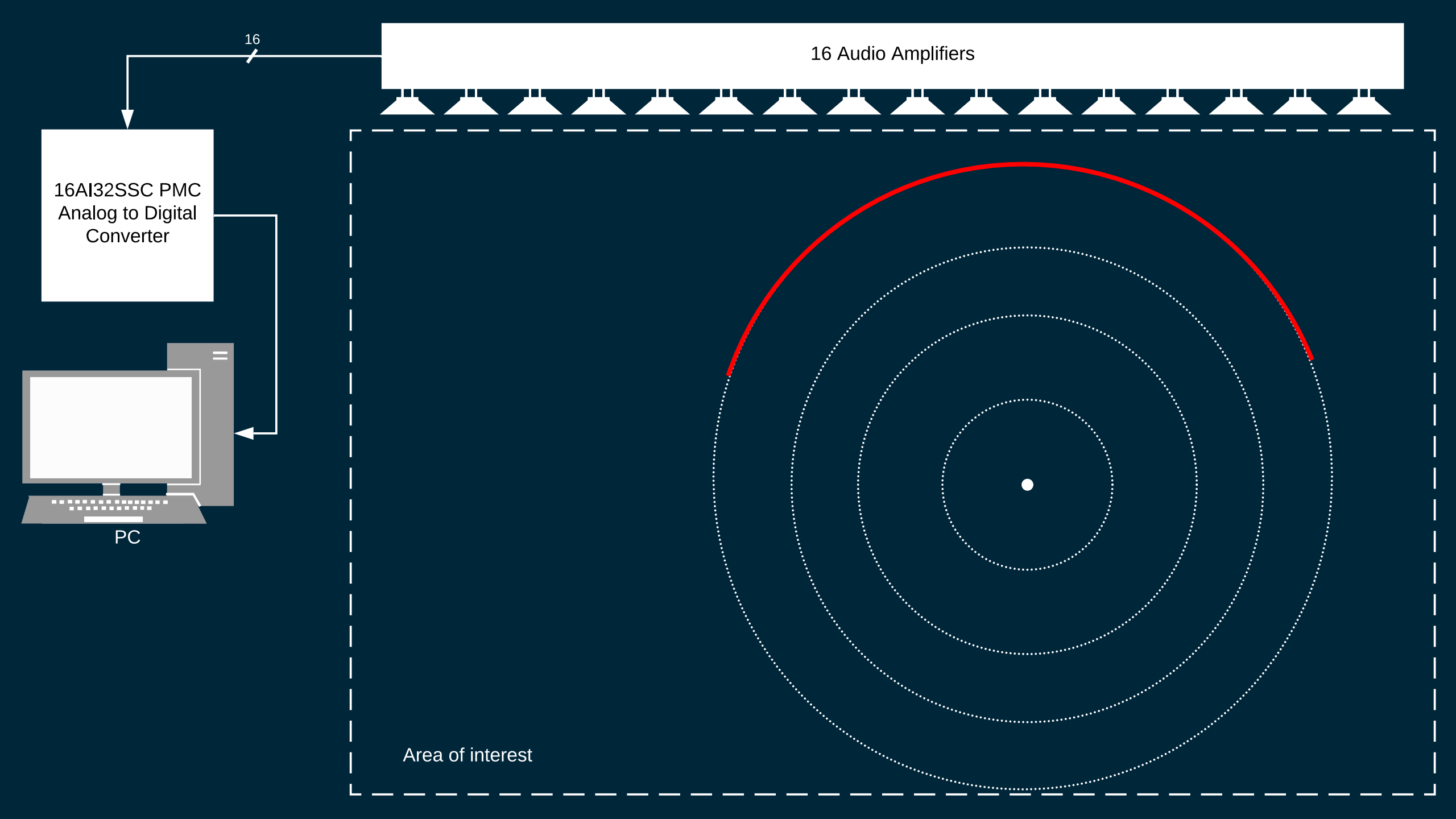
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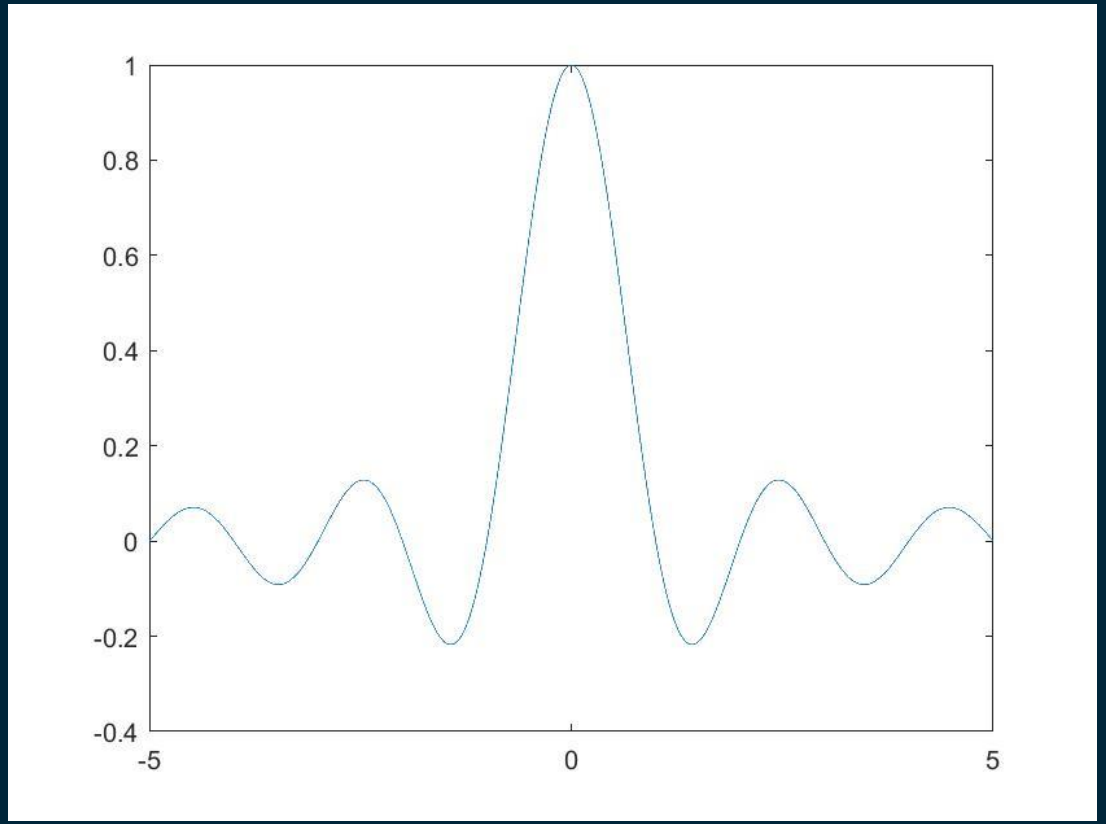
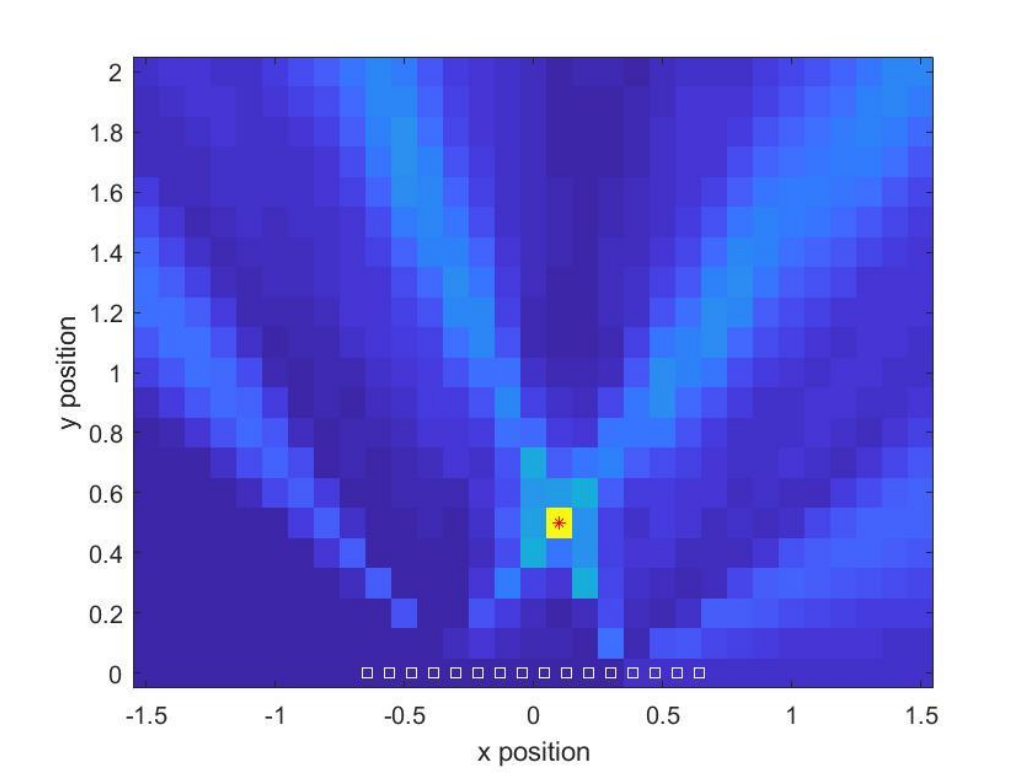
Sinc Interpolation Approach

- Use curvature of audio wave fronts
- Delay signals at each microphones using interpolation
- Use a truncated sinc function to interpolate

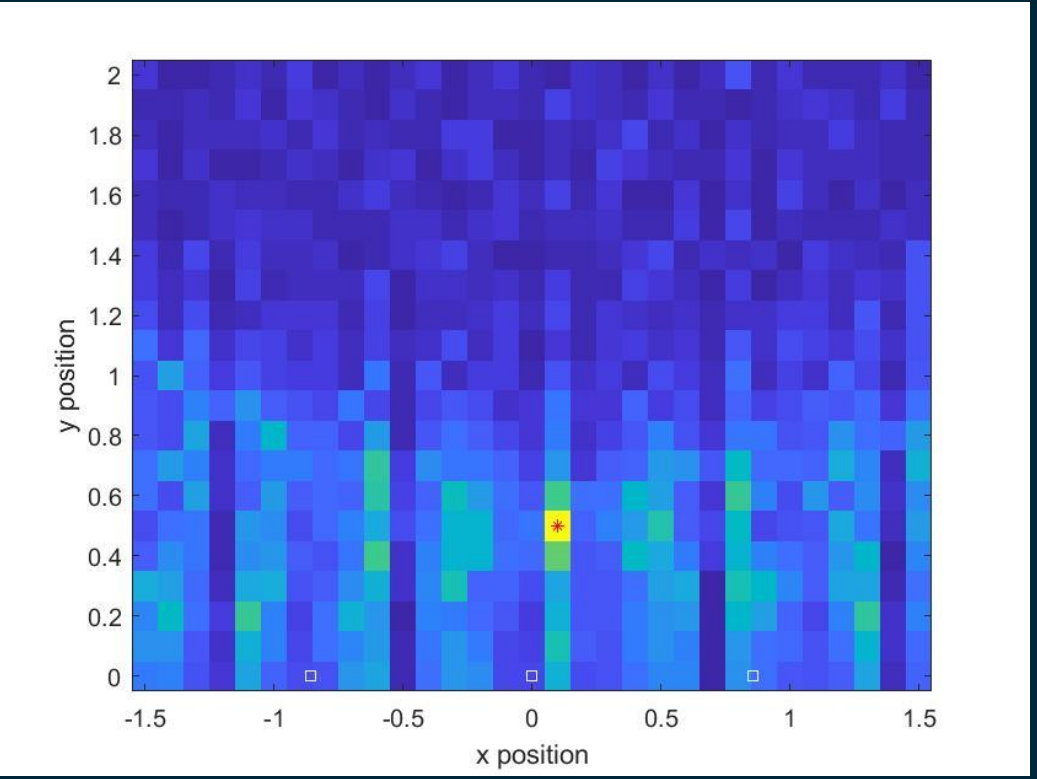


Simulation Comparisons

Dual-beamformer

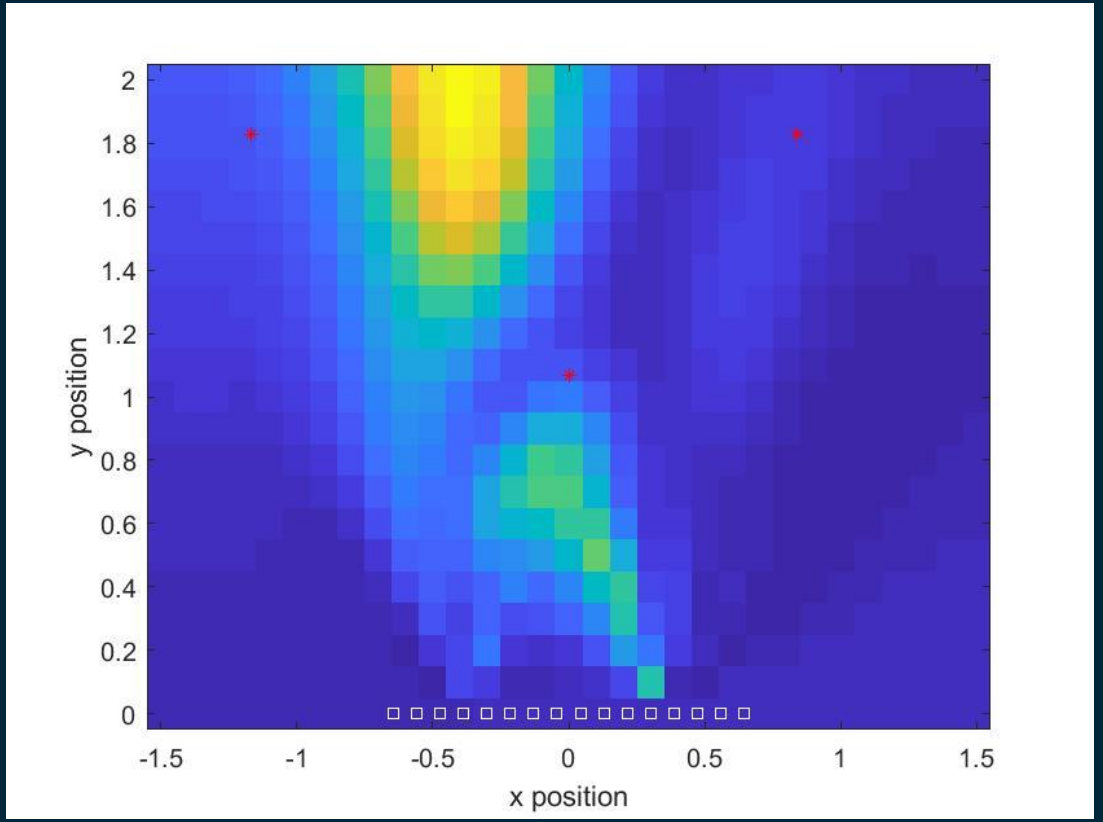


Sinc Interpolator Approach



Implementation Results

- Only dual-beam implementation currently
- 3 audio sources
- Energy graph shows where audio energy is concentrated
- Listening to audio signals shows some separation



Next Steps

- Implement the sinc interpolation algorithm
- Determine which algorithm works better at separating audio signals
- Implement the better algorithm in a real-time system

References

- B. V. Veen and K. Buckley, “Beamforming: a versatile approach to spatial filtering,” *IEEE ASSP Magazine*, vol. 5, no. 2, pp. 4–24, 1988.